



Reproduction in Birds




Characteristics of Birds

- **Avian species is a group of warm-blooded vertebrates constituting the class Aves**
- **They vary in size from about 5.5 cm long (i.e. bee hummingbird) to as long as 2.8 m (i.e. ostrich).**
- **There are about 10,400 living avian species spread widely across the world with more than half capable of flying**





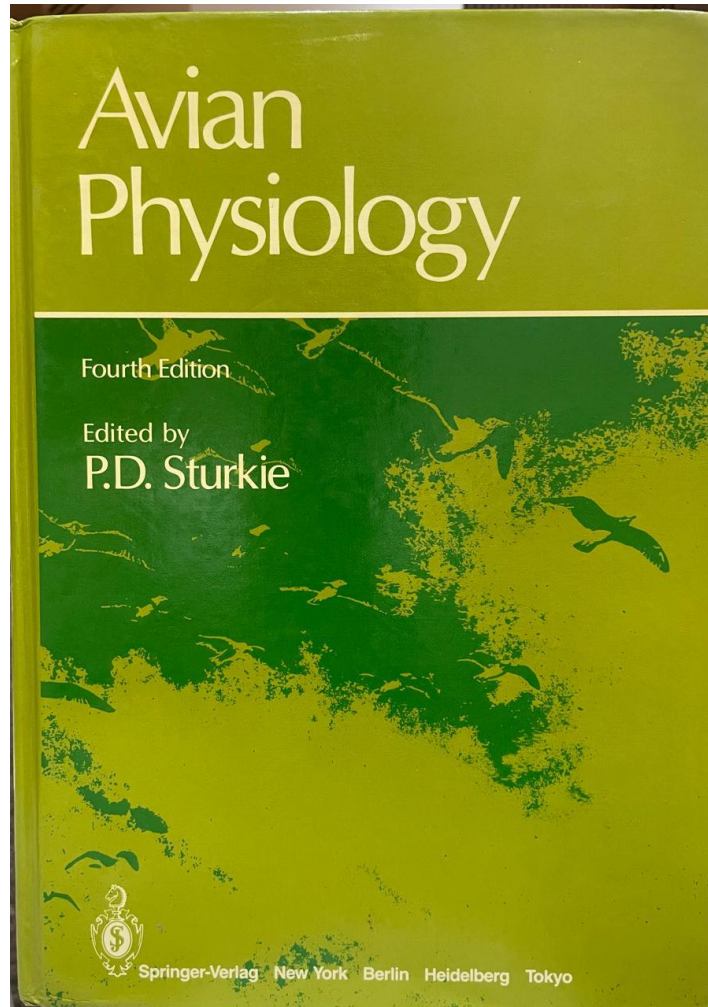
Characteristics of Birds

- **The following characteristics distinguish birds from other Vertebrates:**
- **Body covered with feathers** 
- **Bones are thin and hollow (Lightweight skeleton)**
- **A toothless, different types of Beaks**
- **Body temperatures is generated and regulated internally (from 40-46 degrees Celsius)**
- **Amniote eggs are encased in hard, calcium-containing shells.**
- **Most species eggs are incubated in a nest.**





Reference





CLASSIFICATION OF BIRDS

- Birds are classified into the Kingdom Animalia (i.e. Animals).
- Phylum Chordata
- The Class for birds is **Aves**
- Class Aves is split up into **23 orders**
- More than half of the Class of Aves are in the order Passeriformes





Order Anseriformes

- Swans, geese, and ducks- waterfowl
- Aquatic, webbed-feet for swimming
- Feed on invertebrates, fish, grass, etc
- Bill is typically flattened
- Young are precocial & parental care is provided by female





Order Strigiformes

- Owls
- Sharp, curved beak with sharp talons or claws
- Large, forward-facing eyes
- Keen eyesight and hearing





Order Psittaciformes

- Parrots, parakeets, macaws, cockatoos, & cockatiels
- Live in tropics
- Eat seeds and fruit
- Vocal birds





Order Passeriformes

- **Over 5,900 species Robins, blue jays, and wrens**
- **Perching birds**
- **Feed on nectar, insects, seeds & fruits**
- **Song-birds- males produce song**
- **Syrinx- song is produced in this structure**





Order Struthioniformes

- Ostriches, rheas, emus, and cassowaries
- Ostriches cannot fly and can reach speeds of over 30 mph on land!





Order Galliformes

- Turkeys, pheasants, chickens, grouse, and quails- fowl
- Terrestrial birds- limited flying ability
- Strong gizzard
- Important part of human diet



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Order Columbiformes

- Pigeons & doves
- Feed on fruits and grain
- Crop secretes a nutritious milk-like fluid called crop milk





Order Sphenisciforms

- Penguins
- Heavy bodies
- Crop secretes a nutritious milk-like fluid called crop milk





Reproduction in avian species

- Sexes are separate.
- Paired testes in Male, **Left side only Ovary and oviduct In Female**
- They reproduce sexually.
- Reproduce through **internal fertilization**
- During mating male birds press their **cloaca** to the female's **cloaca** and releases sperm
- Produces **amniotic eggs**, have hard shells and are laid in a nest. The eggs are usually incubated until they hatch.
- Most species have a relatively long period of parental care.



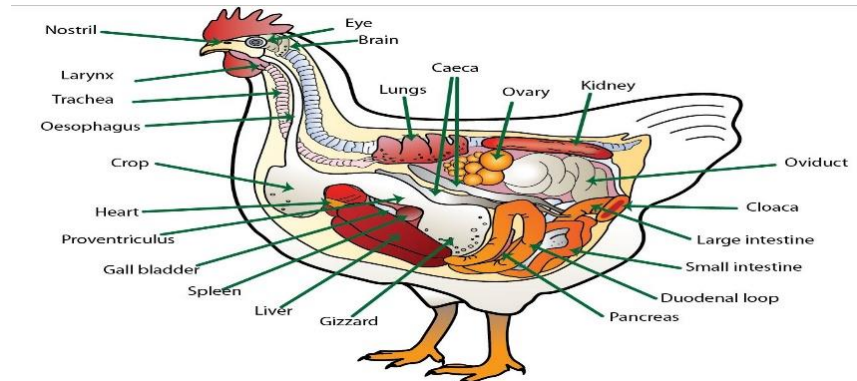
Determination of sex in avian species

- The spermatozoa in avian species are homogametic and carry Z-bearing chromosome. (Male sex chromosome ZZ)
- The ovum carries either Z-bearing or W-bearing chromosomes. (Female sex chromosome ZW)
- Determination of sex mechanisms in avian species differs from that of the mammals where the male is the sex determinant.



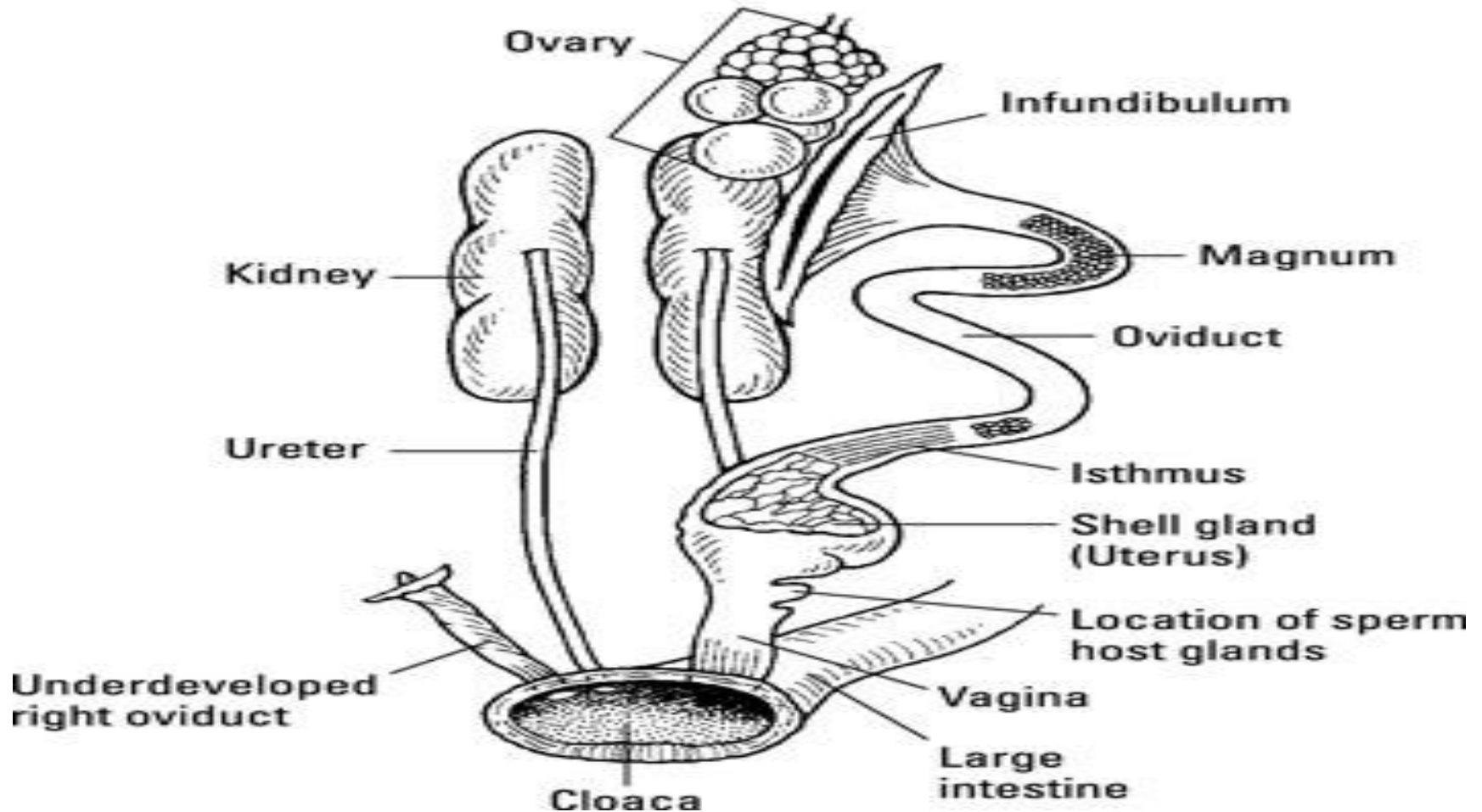
REPRODUCTION IN POULTRY

- ✓ The goal of reproducing young is the same in poultry as in mammalian species.
- ✓ However, the method varies in that the young are not carried inside the body.
- ✓ Rather, the **eggs are laid outside the body (OVOPAROUS)** where they are incubated until the young are ready to emerge (hatch) from the shell.
- ✓ Poultry females (hens) have only one functional ovary (left), unlike mammals, which have two.





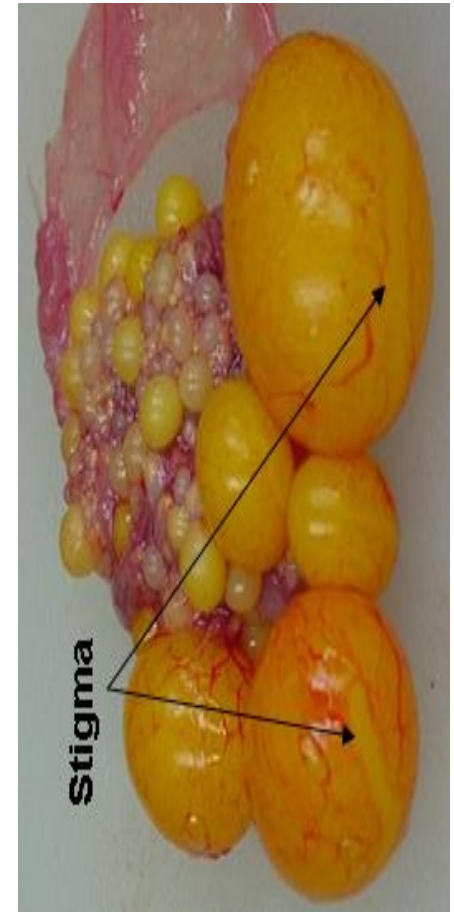
Reproductive system of a hen





Ovary

- ✓ When a female chick hatches, approximately 4,000 ova are attached to the ovary, each enclosed in a follicle.
- ✓ The ova begin maturing at sexual maturity.
- ✓ Each mature ovum is successively released from its follicle by rupture of the follicle wall.
- ✓ **This release from the follicle is called ovulation.**
- ✓ **The rupture occurs along a line called the stigma.**
- ✓ **The ovum (yolk) moves into the oviduct where the additional parts of the egg are added.**

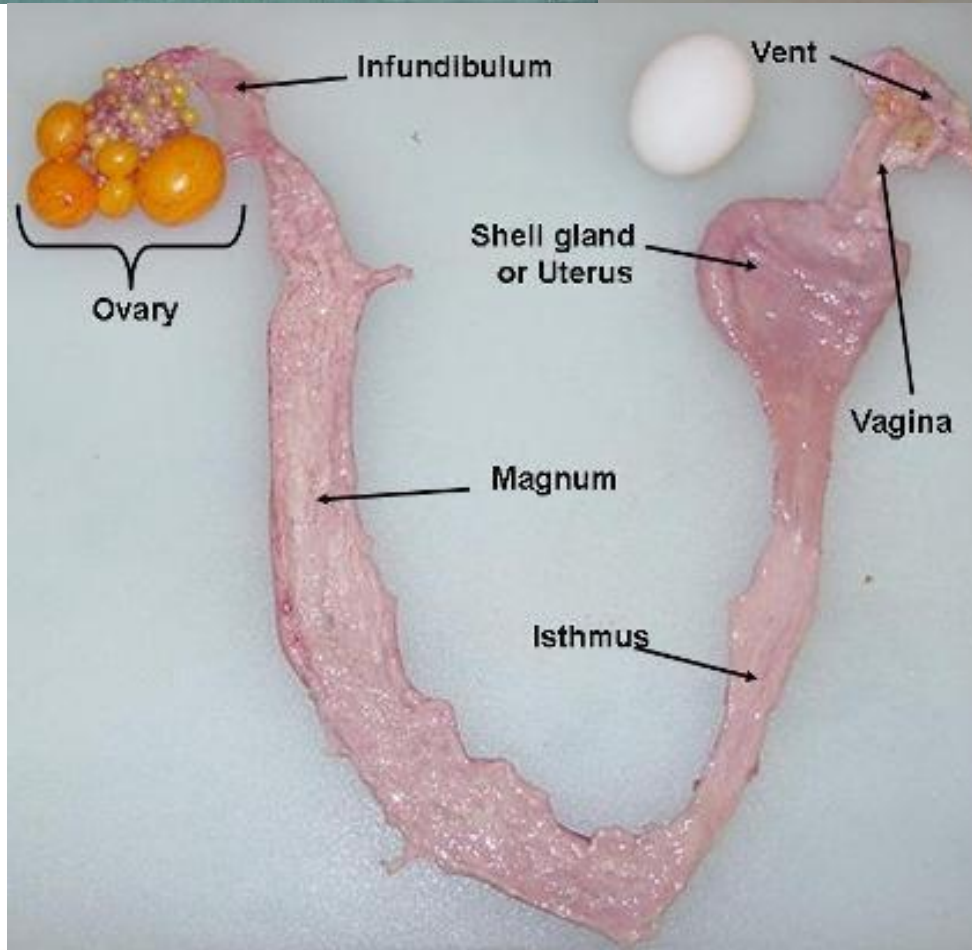
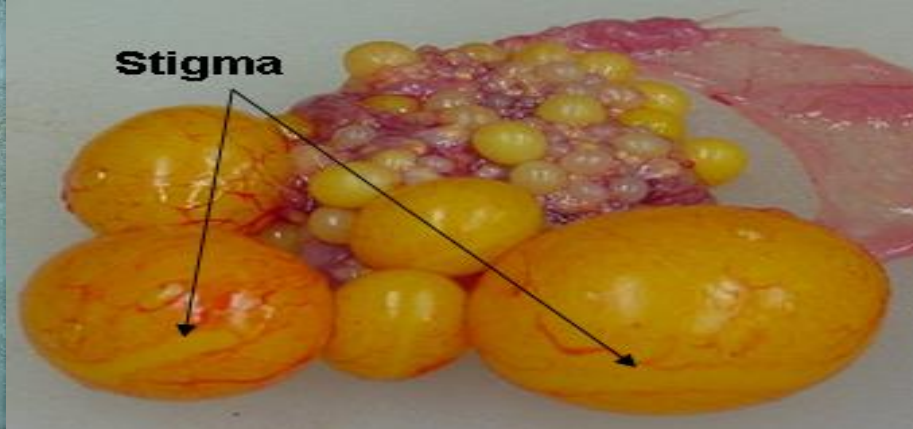
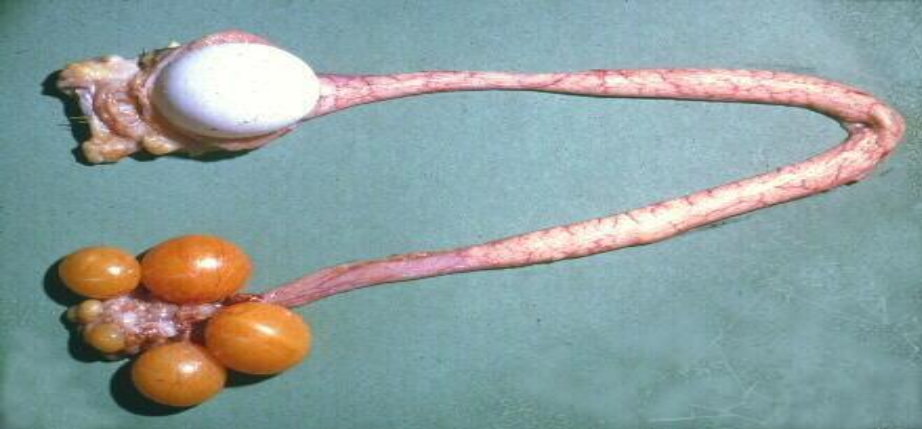




Ovary

- ✓ Each ovum starts as a single cell surrounded by a vitelline membrane.
- ✓ As the ovum develops, additional yolk forms.
- ✓ The yolk = ovum is surrounded by a layer of supporting cells called follicle
- ✓ The color of the yolk comes from fat-soluble pigments, called xanthophylls, contained in the hen's diet.







Reproductive Tract

When mature the ovum enters the oviduct which consist of 3 parts

✓ **Infundibulum**

✓ **Magnum**

✓ **Isthmus**

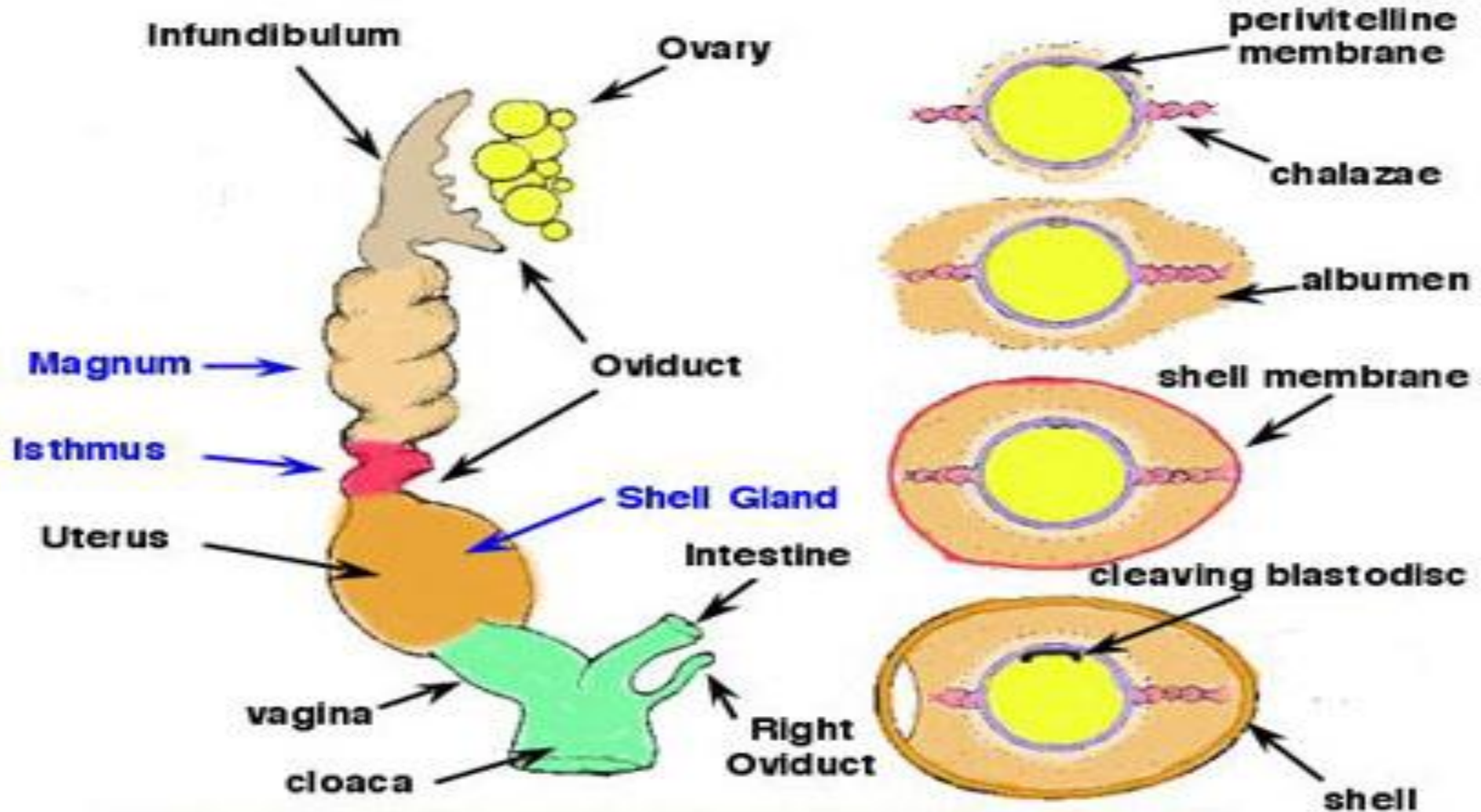
Further development of the egg then occurs in:

✓ **Uterus**

✓ **Vagina**



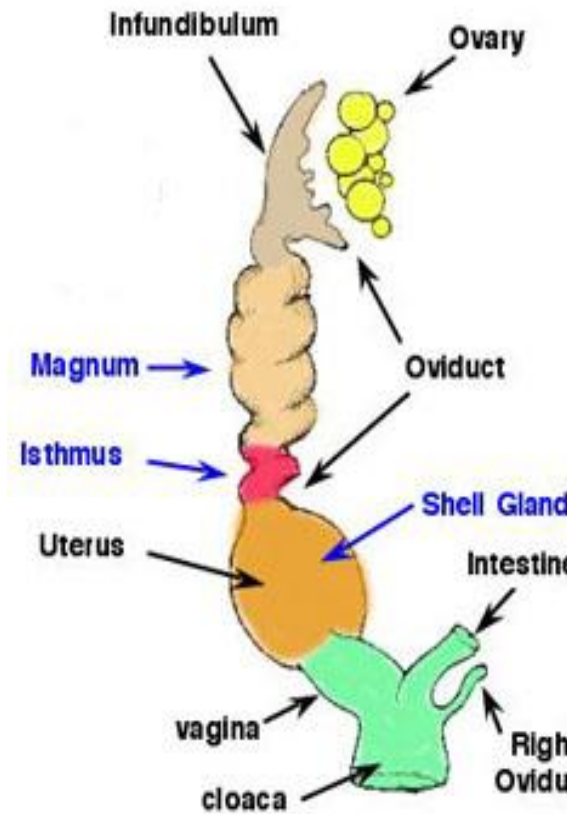
Reproductive Tract (Formation of egg)





Reproductive Tract (Infundibulum)

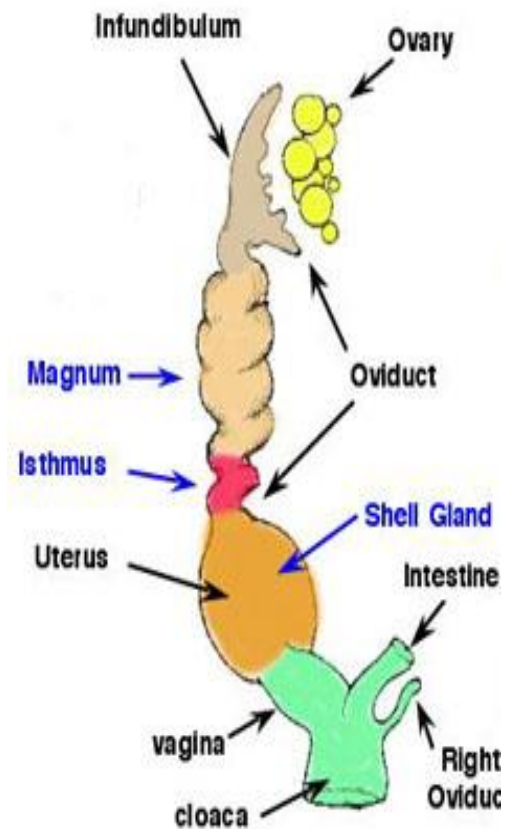
- ✓ The first part of the oviduct, the infundibulum (or funnel) is 3 to 4 inches long and engulfs the ovum released from the ovary
- ✓ The infundibulum, captures the yolk from the follicle after ovulation.
- ✓ In the infundibulum, fertilization occurs if sperm are present.
- ✓ Sperm can remain viable for up to several weeks in some species (2 weeks chicken)
- ✓ The total time the yolk spends in the infundibulum is about 15 to 30 minutes





Reproductive Tract (Magnum)

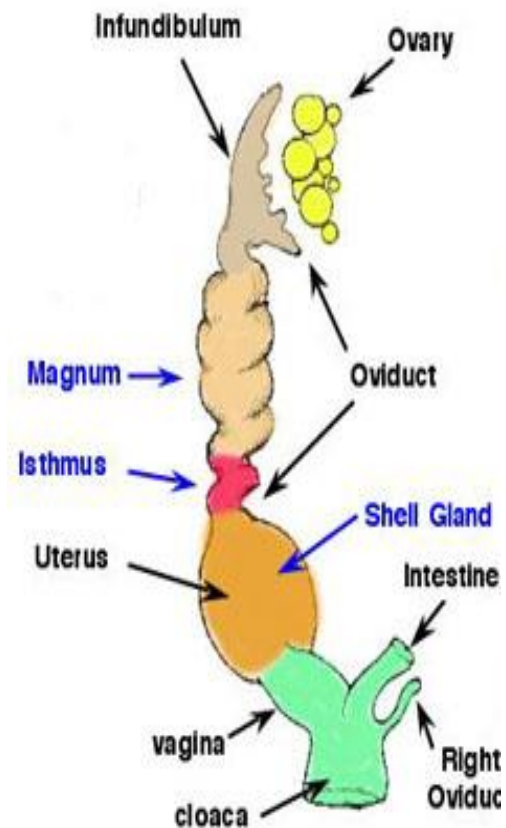
- ✓ The yolk moves into the second portion of the oviduct, **the magnum for 2 to 3 hours.**
- ✓ During which time the thick portion of the albumen, or “white” of the egg is added.
- ✓ The magnum is approximately 13 inches long, and considered the largest section of the oviduct (magnum being the latin word for "large").





Reproductive Tract (Isthmus)

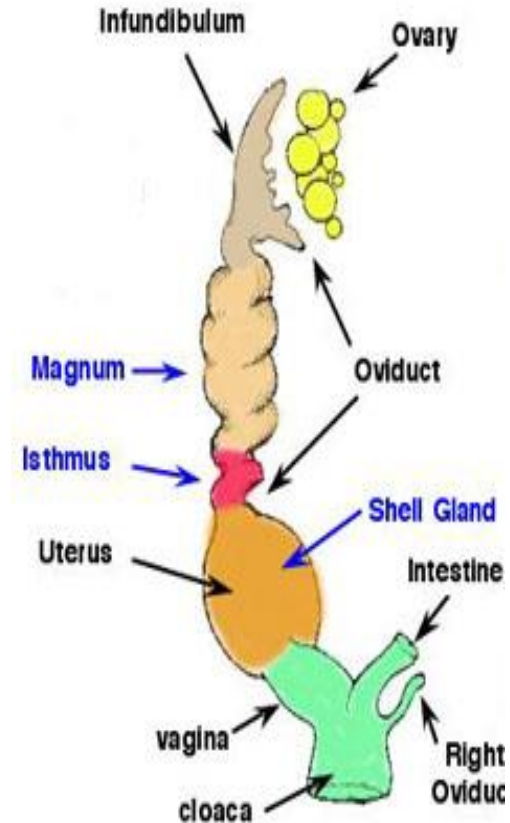
- ✓ The third section of the oviduct is the isthmus, which is 4 inches long. The isthmus is where the inner and outer shell membranes form.
- ✓ **During the 1.5 hours that the egg is in the isthmus**, it takes up water and mineral salts and the inner and outer membranes of the shell are added.





Reproductive Tract (Uterus)

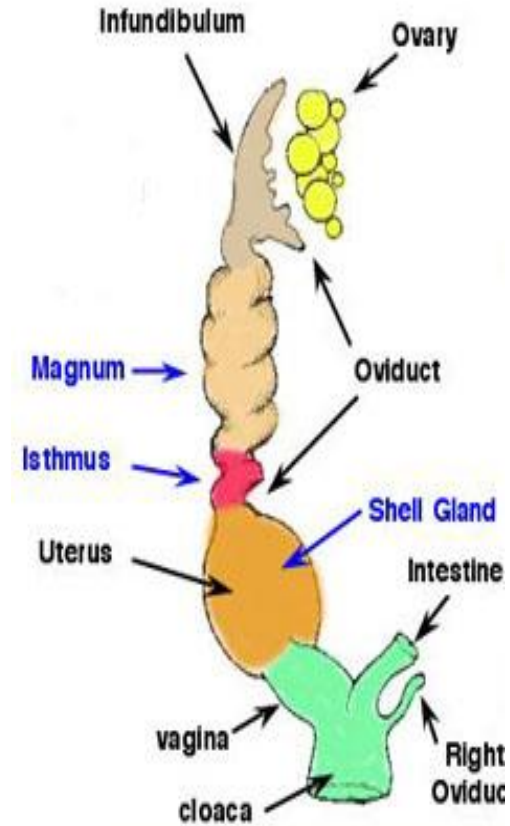
- ✓ **Calcification of the shell as well as, shell pigmentation occurs in the uterus, or shell gland, which is the next portion of tract**
- ✓ **From the 18 to 20 hours the egg is in the uterus, it undergoes “Plumbing” a process of adding water and minerals to the egg through the previously formed membranes.**
- ✓ **In addition, the remainder of the albumen is added in the uterus.**





Reproduction (vagina)

- ✓ After the shell formation is complete, the egg moves from the uterus into the vagina
- ✓ which is about 4 to 5 inches long.
- ✓ The vagina does not really play a part in egg formation
- ✓ The vagina is made of muscle that helps push the egg out of the hen's body.
- ✓ Here the bloom or cuticle is added to the outer layer of the shell.
- ✓ From there the egg passes through the cloaca for oviposition (expulsion to the outside of the hen's body).

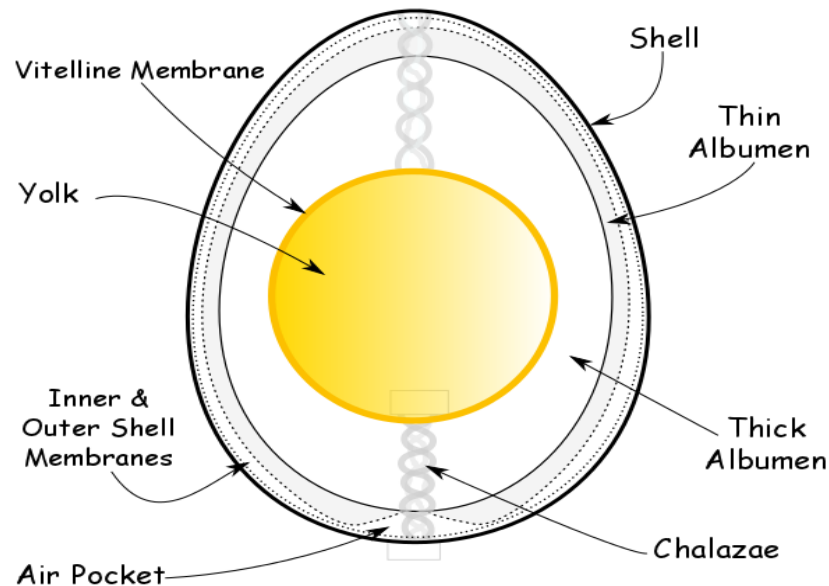


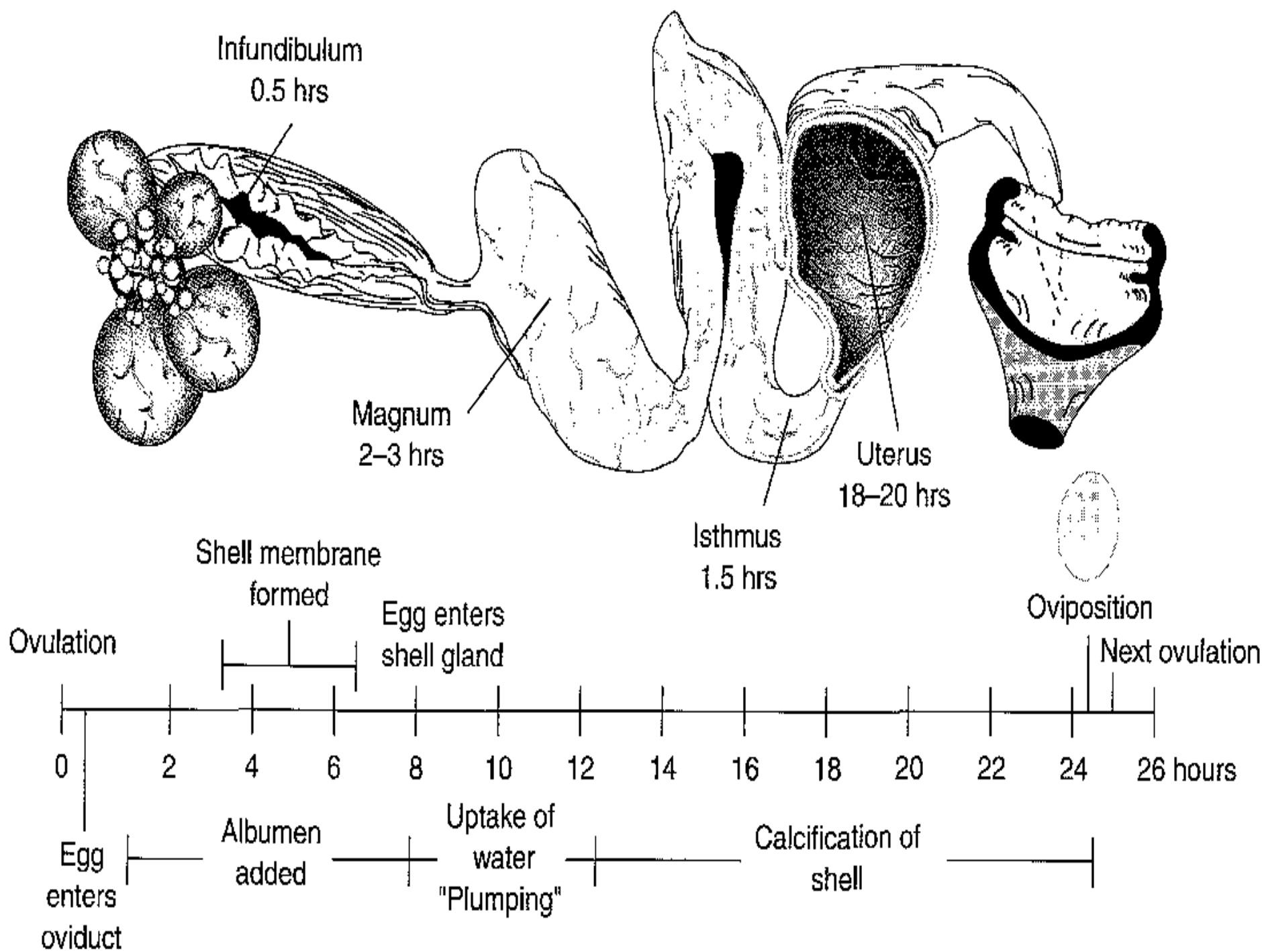


The total time from ovulation to the laying of the egg is slightly more than 24 hours.

Approximately 30 minutes after the egg is laid, another ovulation occurs and the process is repeated.

Fertile eggs may be incubated by the hen, or collected for artificial incubation.







Reproductive tract anatomy of the Rooster

- ✓ The function of the male is to produce semen, mate, and ejaculate.
- ✓ Sexually active rooster produces 3 billion sperm cells per day.





Secondary sexual Characteristics of the Rooster

1. Size

2. Comb and wattles

3. Feathers

4. Spur

5. Behavior



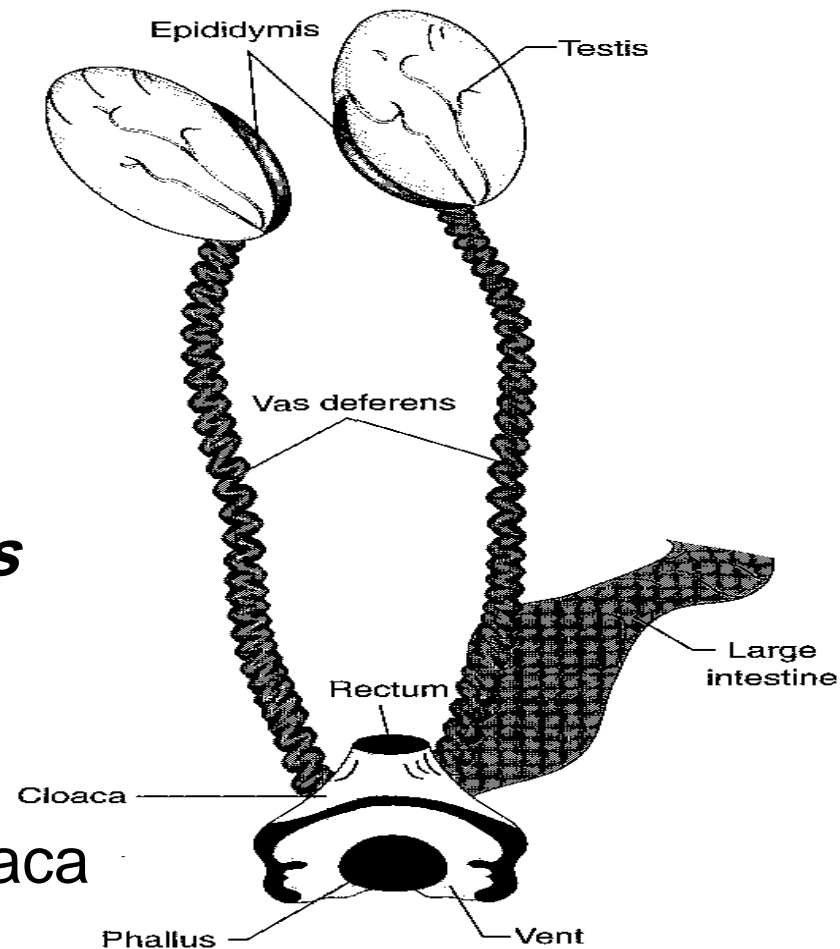


Components of the reproductive tract in Roosters

Each tract consist of 3 components:

1. The testis
2. Epididymis
3. Convoluted deferent duct (*Vas deference*)

Both tracts are connected to the cloaca





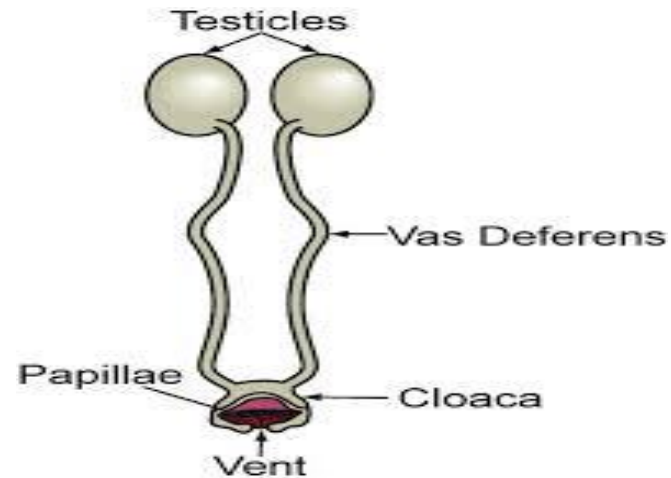
Differences between roosters and other mammals

- ✓ The differences begin with the testes, which are found inside the body cavity rather than outside it.
- ✓ The sperm cells move from the testes into the vas deferens, then the cloaca and terminates in small papillae found in the wall of the cloaca. In mammals it also passes through the ureter.
- ✓ During copulation, the sperm are deposited from the male cloaca in the oviduct via the cloaca of the female.



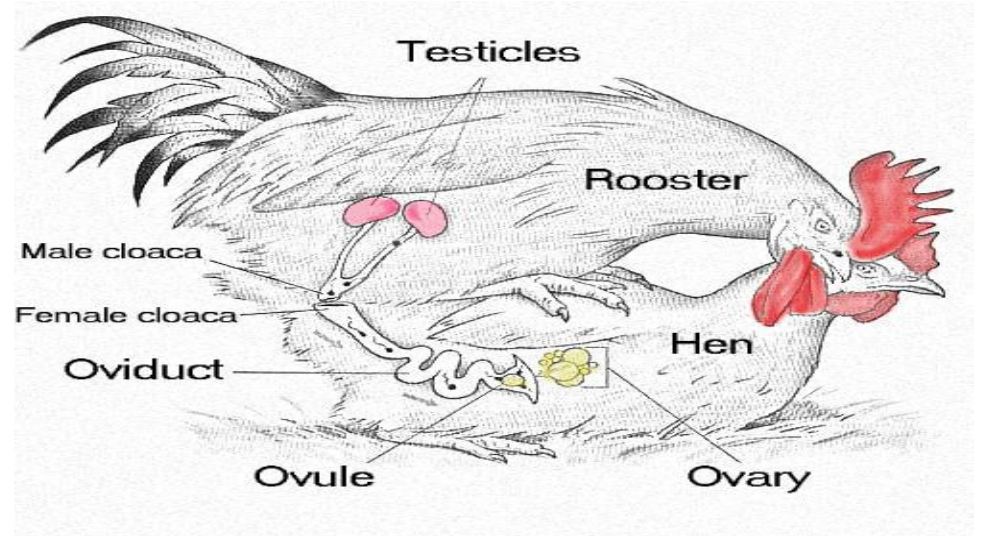
Deferent duct

- ✓ The deferent duct transports the sperm from the testes
- ✓ During mating sperm enters the rooster's cloaca into a small pimple-like structure.
- ✓ This structure equates to the mammalian penis and is much larger in ducks to form a penis like organ.
- ✓ From there it enters the hen's cloaca and transits into the oviduct





Copulation





Copulation

- ✓ Hens will lay eggs in the absence of males, (eggs are sterile)
- ✓ It is not necessary for sperm to be present in the female's reproductive tract for an egg to form.
- ✓ The sperm carry half of the total chromosomes required to produce an embryo.
- ✓ However, if reproduction of the species is desired, (eggs are fertile) sperm must be present in the infundibulum during the process of egg formation.



Parental Care

Most birds care for their eggs and their young

Birds usually lay their eggs in nests

Hold eggs and conceal them from predators and other elements

Nests are built from available materials

Twigs, barks, grasses, feathers...etc.

One or both of the parents warm, or **incubate**, the egg by sitting on them



EGG WHITE:

Inner layer of thin albumin

Outer layer of thin albumin

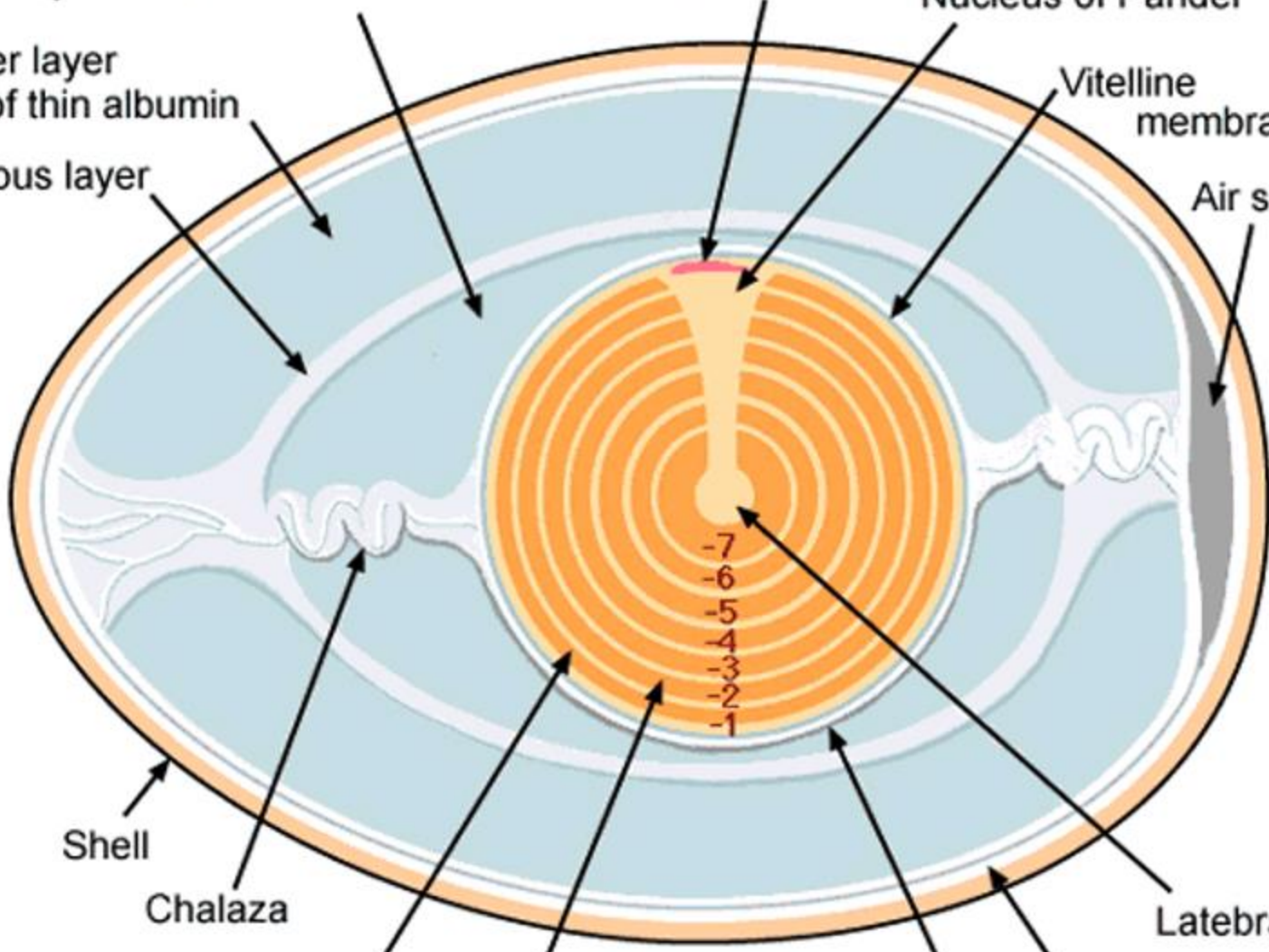
Fibrous layer

Blastoderm

Nucleus of Pander

Vitelline membrane

Air space



Shell

Chalaza

White yolk

Yellow yolk

-7
-6
-5
-4
-3
-2
-1

Chalaziferous layer

Shell membrane

Latebra